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proposed the name Teleocephali for the order containing the whole ancestral trunk of the bony fishes, from the primitive semi-ganoid types to the highly specialized cottoids and labroids, leaving only the divergent branches to be recognized as separate orders.

The Anacanthini, relieved of the flounders which have no relationship to the cod-fishes, Dr. Boulenger places near the Persesoces.

The Ammodytidae are wrongly placed by Dr. Boulenger with the Percesoces; as in Embolichthys, the genus possessing ventral fins, has these fins at the throat.

The great body of the remaining fishes are placed in the suborder Acanthopterygii, defined essentially as by Gill, Jordan and Evermann and Hay. The Beryces are placed among the Perciformes. The recent discovery by Mr. Starks that all Beryces possess the orbitosphenoid bone, absent in other Acanthopterygii and characteristic of the lower forms, indicates that the Beryciformes (Pempheris and Aphredoderus excluded) should form a division by themselves.

The group Zeorhombi, containing Zeidæ and the flounders, represents an ingenious guess. Even if the flounders, as is probable,, be descended from ancestors of Zeus, the present differences justify their separation into a distinct division. Zeorhombi is insusceptible of definition. The remaining orders, Opisthomi, Pediculati, Plectognathi, are arranged as generally accepted, but the Plectognathi are only specialized and degraded offshoots from the Chætodontidæ—Acanthuridæ series with which they form a nearly continuous line of degeneration.

As Dr. Boulenger extends the range of his work, he will find it convenient to recognize a greater number of families, while American ichthyologists will mark their progress by the gradual reduction of the number defined by them. This arises from a different method of work, a different view as to convenience in regard to divergent or imperfectly known forms. Thus every year brings workers on the taxonomy of fishes nearer and nearer together, and farther and farther from the Cuviernian idea of the perch as a perfect fish to be placed first with the others following after.

D. S. J.

Notes on Recent Fish Literature.— In the *Bulletin U. S. Fish Commission* (1902) Jordan and Evermann describe two new fishes from Hawaii, *Tropidichthys psegma* and *Iracundus signifer*, the latter representing a new genus of Scorpænidæ, allied to Pontinus.

In the *Bulletin of the U. S. Fish Commission* for 1902 (1903), William C. Kendall gives a useful list of the certain river-fishes of Maine. *Leuciscus carletoni*, a new species, with a barbel, and therefore better referred to Couesius, is described as also *Pimephales anuli* (named for Edgar E. Ring) and *Coregonus stanleyi*.

In the *Revista Chilena de Historia Natural* (Valparaiso, VII, 1903) Dr. F. T. Delfin discusses in much detail the fishes known as Congrios in Chile, Ophidiidæ of the genus Genypterus.

In the *Smithsonian Miscellaneous Collections* (XLV, 1903), Dr. C. H. Eigenmann defines 21 new genera of South American river fishes of the group of Characinidæ in advance of his monographic review of the group. It is to be regretted that a closer adherence to classical models did not prevent the suggestion of such names as Holoshesthes, Stichonodon, Colossoma and Mylossoma.

In the *Proceedings of the Zoological Society* of London (1903), Mr. C. T. Regan gives a review of the East Indian fishes of the genus Triacanthus. In this as in many other cases it appears that the species recognized by Dr. Bleeker are all really valid in spite of the doubts expressed by subsequent authors with more scanty material.

In the *Proc. U. S. Nat. Museum* (XXVI), Barton A. Bean describes a new minnow, *Notropis brimleyi* (near *N. coccogenis*) from Cane River, North Carolina.

In the *Atti della Società Italiana di Scienze Naturali* (XLII, 1903), Dr. Cristoforo Bellotti of the Museum of Milan describes an interesting new species of fish, *Pteraclis macropus*, taken off Yokohama.

In the *Proceedings of the U. S. National Museum* (XXVII, 1904), Mr. E. C. Starks discusses the osteology of the berycoid fishes. This group is one of especial interest because it appears earlier in geological time than any other of the distinctly spiny-rayed types, and it is probable that all these are described from Berycoid stock.

Dr. Boulenger unites the berycoids with his perciformes, notwithstanding the archaic characters retained by most of them. Mr. Starks shows that all of them retain one hitherto unnoticed archaic character which is lost in all the other spiny-rayed fishes. This is the development of the bone called osbitosphenoid.

This bone he finds in Hoplostethus, Beryx, Holocentrus, Myripristis, Polymixia and Monocentris. It is not found in Pempheris or in Aphredoderus, which genera should be excluded from berycoid association. The orbitosphenoid is present in the Isospondyli and in the ganoids. It is wanting in the Haplomi and in Aulopus and

Synodus. This fact may indicate an additional character by which to distinguish the order Haplomi, and that Boulenger is right in referring Aulopus and Synodus to this order.

Starks finds that the close resemblance of the barbels in Polymixia to those in Mullus and Upeneus has no phylogenetic significance. While the organs in the two cases look much alike, they are developed in quite different fashion.

In Polymixia each barbel is suspended from the hypohyal, where three short, rudimentary branchiostegals curve around its thickened base. In Mullus and its relatives, the barbel is the extreme tip of a slender ray of bone attached to the end of the ceratohyal, and without relation to the branchiostegals.

In the *Bulletin of the U. S. Fish Commission* (1902, published 1904), Professor John O. Snyder gives a list of the shore fishes taken by the "Albatross" expedition in 1902. Two hundred and twenty-seven species are recorded, with excellent figures of 25 new species not taken by the previous expeditions of Dr. O. P. Jenkins (1889) and Jordan and Evermann (1901). Two new genera are described, Veternio, a toothless Conger eel, and Collybus, a genus of Bramidæ.

In the *Bulletin U. S. Fish Commission* (for 1902, published in 1904), Dr. Jordan gives a list of species of small fishes from coral pools, taken at the Tortugas, Florida, by Dr. Joseph C. Thompson, U. S. N., now surgeon of the "Albatross,"— *Ctenogobius tortugæ*, *Gnatholepis thompsoni*, *Elacatinus oceanops*, and *Ericteis kalisheræ*. Elacatinus is a new genus of gobies, Ericteis a new genus of blennies, in which group another genus, *Acteis* (*moorei*), is detached from Malacoctenus.

Chaetodon bricei is shown to be the young of *Chætodon capistratus*, and the nominal species of Doratonatus are all probably identical with *D. megalepis*. The rare *Holocentrus siccifer* (Cope 1871) is again recorded.

Mr. Henry W. Fowler, now of the Academy of Natural Sciences at Philadelphia, has in the *Proceedings* of that institution (1903) a number of papers on fishes largely of the Pacific Ocean. Of special interest are the following: *Atherina sardinella*, a new species from Italy; Atherinomorus, a new sub-genus for the West Indian *Atherina laticeps*, *Protistius semotilus* Cope redescribed. This genus is allied to Atherinopsis, but has only a single dorsal spine. Gastropterus Cope is the same as the later Pisciregia of Abbott.

Atherinops magdalenæ Fowler is described from Magdalena Bay, Lower California. *Mugil kelaarti* is described from Honolulu. *Liza caldwelli* is redescribed from Samoa. A new sub-genus, Aodalechilus, is proposed for *Mugil labeo*. *Sphyræna tome* is described from Sambaia, Brazil. *Centrobranchus chærocephalus* is described from Hawaii. Centrobranchus is a new genus of Myctophidæ allied to Rhinoscopelus, but the gill rakers reduced to bunches of spines.

Numerous species are recorded from Zanzibar. These papers are illustrated with good plates.

In the Danish *Meddelser om Grönland* (XIX, 1904), Mr. A. S. Jensen gives a list of the fishes of Eastern Greenland, based on the collections of the Amdrup-Hartz expedition of 1900. Thirty-six species are included, the following being new: *Lycodes eudipleurostictus*, *Lycodes* (*reticulatus*) *macrocephalus* and *Lycenchelys kolthoffi*. Excellent faunal notes are given with a very convenient bibliography. According to Jensen, the American Cottus or *Oncocottus hexacornis* is identical with the European *quadricornis*, as Jordan and Evermann had suspected. The American *Artediellus atlanticus* is also shown to be the same as the European *A. uncinatus*, from which Jordan and Evermann thought it apparently distinct. The name *Icelus bicornis* is rightly used instead of the later *Icelus hamatus*. The Greenland species known as *Liparis tunicata* proves to be the same as *Liparis liparis*. *Liparis fabricii* is different. *Paralepis kröyeri* is shown to be different from *P. borealis* and the Charr of East Greenland is identified as *Salmo* (better *Salvelinus*) *alpinus*. The engravings are entirely worthy of this admirable piece of faunal study.

Professor Keinosuke Otaki of the Imperial Military Academy of Tokyo, a graduate of Stanford University, has begun in connection with Professor T. Fujita and T. Higurashi the publication of a serial work entitled "Fishes of Japan." The text is in Japanese and English. The species included in part first are *Lateolabrax japonicus*, *Latilus sinensis*, *Gymnosarda affinis* and *Seriola quinqueradiata*. These are illustrated by colored plates well executed by Mr. K. Ito.

In the Report on the Sea and Inland Fishes of Ireland for 1901, Messrs. E. W. L. Holt and L. W. Bryne describe and figure a translucent symmetrical larval flounder, which they regard as the young of the "White Sole," *Glyptocephalus cynoglossus*. The mouth is shown as much larger than in the adult of this species, which may throw doubt on the identification.

The same gentlemen in a later paper describe and figure all the British gobies. Their plates will greatly aid in the identification of these little fishes.

In the *Annuaire du Musèe Zoologique* at St. Petersburg (VIII, 1903), L. S. Berg discusses a collection of Cottoid fishes from Lake Baical, with observations — unfortunately in Russian — on the classification adapted by Jordan, Evermann and Starks. Two new genera, *Baicalocottus* and *Batrachocottus*, are defined, with the genus Procottus of Gratz.

When the present writer was in Japan in 1900, the Imperial Museum generously placed at his disposal all duplicates of new species of fishes contained in the Museum. Those represented by single examples could not be sent away, and these the director of the Department of Natural History, Dr. Chiyomatsu Ishikawa, has undertaken to describe for the sake of completing the rich faunal list of Japan.

In the *Proceedings of the Imperial Museum*, Dr. Ishikawa describes the following new species, most of them with good figures:

Zezera hilgendorfi, *Zacco mitsukurii*, *Leuciscus dorobaë*, *Stromateoides nozawæ*, *Heterognathodon dœderleini*, *Cirrhilabrus lyukyuensis*, *Amphiprion snyderi*, *Crenilabrus stejnegeri*, *Tetraroge kagoshimensis*, *Hemitripterus nipponicus*, *Podothecus tokubire*.

Of these the Crenilabrus from the Riu Kiu Islands is the most interesting, as that genus, largely represented in the Mediterranean, had never before been recorded in other waters. The Tetraroge should rather be referred to the genus Erisphex.

In the *Records of the Australian Museum* (V, 1904) Mr. Edgar R. Waite gives an account of his explorations of Lord Howe Island. Seventeen known species of fishes were added to the fauna of this interesting island. Ten new species were discovered, most of these with a number of other interesting forms being figured by Mr. Waite. The new genera are Xenogramma (Gempylidæ), Allogobius, Limnichthys (Trichonotidæ) and Lepadichthys (Gobiesocidæ). The fauna as a whole, although distinctly tropical, is very different from that of Hawaii or Samoa.

In the same *Records* (V, 1904) Mr. Waite gives a list of the fishes known from Lord Howe Island, 180 in number, with a bibliography. The list is especially useful for comparison with faunal lists of the South Seas, the genera being largely identical, the species different. In this list Mr. Waite has taken special care to verify the dates of publications.

In the *Transactions of the American Philosophical Society* (XX, 1901) Dr. O. P. Hay gives a valuable table showing the chronological distribution of the genera of elasmobranchs. He calls attention to one remarkable fact. While many genera and species (Cladoselachidæ, Acanthoëssidæ, Psammodontidæ, Pleuracanthidæ, Cladodontidæ, etc.) occur in the Devonian and Carboniferous ages, only three genera remain in the Permian and but four in the Triassic. All these are Heterodontidæ, the successors or descendants of the Orodontidæ of the Carboniferous. In the Jurassic, numerous families with many genera appear, and through these from Heterodontid stock the modern sharks seem to have sprung. Apparently the Paleozoic families, except the Orodontidæ, have no modern descendants.

In the *Bulletin of the Museum of Comparative Zoölogy* (XLI, 1904) Samuel Garman gives an elaborate and excellent account with beautiful plates of the anatomy of the long-nosed Chimæra of Japan, *Rhinochimæra pacifica* (Mitsukuri). In connection with the study of this species, he has given a general account of the living chimæroid fishes, with figures of some of them. On grounds of priority, Mr. Garman substitutes the name Chismopnea Rafinesque, 1815, for the later name Holocephala of Muller (1834).

In the *Geological Magazine* (IX, 1902) Dr. Charles R. Eastman founds a new family of fossil sharks, Peripristidæ, on the genus Peripristis (Pristodus).

In the *American Geologist* (XXX, 1902) Dr. Bashford Dean gives illustration of a startlingly perfect preservation of the muscular fibre of a shark, *Cladoselache fyleri*, in the Cleveland shales. This was an estuary deposit originally of fine mud, in which the fish remains became phosphatized.

In the *Proceedings of the Academy of Natural Sciences of Philadelphia* (1903) Dr. Carl H. Eigenmann and Clarence H. Kennedy discuss a large collection of river fishes, made in Paraguay by Prof. J. D. Anisits of the Paraguay National University. One hundred and nine species are noted, many of them new, and the paper is followed by a useful biography. A feature of special convenience is a synopsis of the genera of Cichlidæ, 25 in number, Biotodoma and Biotœcus being new names.

In the *Annotationes Zoologicæ Japonenses* of the Imperial University of Tokyo Dr. Bashford Dean gives a study of the development of the egg of the Japanese shark, *Heterodontus japonicus*. He finds good evidence of the existence of holoblastic cleavage.

In the Christiana *Videnskabs-Selskabs Vorkandlinger* for 1902 and 1903 (the last volume being published from the Fridtjof Nansen fund) Dr. Robert Collett gives additional records of additions to the fish fauna of Norway. These admirable notes are of great value to the student of the fishes of Northern Europe, as well as of Northern regions generally.

Jordan and Starks continue in the *Proceedings of the U. S. National Museum* (XXVII, 1904) their monographic accounts of the fishes of Japan.

In the review of the Scorpænidæ 52 species are described as Japanese, 14 of these being new. These are arranged in 23 genera, the following being new: Thysanichthys, Sebastiscus, Lythrichthys, Ebosia, Decterias, Inimicus, Ocosia, Erisphex. The new species and most of the new genera are figured.

The Cottidæ of Japan are also described in detail by the same authors. In these fishes as in the Scorpænidæ, of which the Cottidæ are the Arctic descendants, the waters are particularly rich. Fifty-seven species are described, 19 being new. These are arranged in 40 genera, the new genera being Stlengis, Schmidtia, later called Schmidtina, the name Schmidtia being preoccupied. Daruma, Ricuzenius, Rheopresbe, Ainocottus, Crossias, Elaphichthys, Alcichthys, Furcina, Ocynectes, Bero, Vellitor.

Similar reviews cover the less numerous species of the families of Agonidæ and Hexagrammidæ.

The two species of white Chimæra (*Chimæra phantasma* and *Chimæra mitsukurii*) found in Japanese waters are described and figured by Jordan and Snyder.

D. S. J.

PALÆONTOLOGY.

Eastman's Translation of Zittel, Vol. II.[1]—Since the publication of the first volume of Dr. Eastman's translation of Zittel's *Grundzüge der Palæontologie*, English speaking students have awaited with keen interest the appearance of the second volume, and it may

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[1] von Zittel, Karl A. *Text-Book of Palæontology*, Vol. II. Translated and edited by Charles R. Eastman. London and New York, Macmillan, 1902. 8vo, 283 pp., 373 figs.